

**Objective:**

Research with brain damaged adults has found that this population is likely to have difficulty with visual symbol recognition including understanding of letters, numbers, words, pictographs and environmental signs, and logos. Decades of aphasia research have attempted to differentiate whether difficulties are exclusively language based or if perhaps there is a global symbolic deficit associated with aphasia. Whereas, TBI researchers suggest that the reduced latency and accuracy in cognitive control, initiation and memory causing retrieval deficits may be due to a centralized cognitive slowing in patients with TBI. Professionals advocating for appropriate management of patients who have suffered either a CVA or TBI stress the importance of these patients understanding environmentally relevant stimuli as a necessary tenet to functional communication. The purpose of this study is to investigate the impact of environmental symbol training for communicatively impaired patients due to CVA and TBI.

**Methods:**

Two Caucasian, male, college educated subjects, who were each one and one-half years post neurological impairment were studied. The subject with anomic aphasia secondary to CVA (age = 60 yrs) evidenced mild to moderate impairments in auditory comprehension and word retrieval, while the subject who had a TBI (age = 53 yrs) demonstrated mild to moderate impairments in memory and verbal expression. An ABAB multiple baseline design was used to measure the effects of alternating withholding and administering treatment over a 12 week period. Both subjects received the same training protocol with the same visual stimuli including 4 composites (collages) of environmental stimuli and 50 individual sheets each containing one environmental stimulus. These single stimulus sheets included simple road signs, environmental pictographs, company logos, trademarks, unusual road signs, obscure logos (those felt to be difficult to identify without the written name or context), foreign/unknown stimuli and nonsensical stimuli (i.e. a picture of a parking space with a tree in the middle indicated it was "reserved for drunk drivers). Initially, in each training phase, composites (collages with multiple stimuli) were used to demonstrate associations and differences. For instance, a collage of numerous road signs was used to discuss the relevance of color and shape to understanding them. In subsequent sessions 10 stimuli were chosen from the 50 chosen for the training and the protocol facilitated the patients' verbal identification, then, verbal explanation of direct and indirect associations. Thus, visual comprehension and memory, as well as, mental flexibility and word retrieval were targeted. Treatment was administered for 15 minutes a session, twice weekly during the "B treatment" weeks during the patients' scheduled 2- 1 hour per week individual treatment sessions. It should also be noted that subjects were additionally receiving 2- 1 ½ hour group treatment sessions for a total of 5 hours a week of speech pathology services. Pre-post testing was used to assess the overall response to treatment. Symbol recognition was assessed through use of an environmental symbol assessment utilizing a non-verbal format. In this task subjects viewed digital pictorial target stimuli and identified the associated choice (from a field of 4) to demonstrate comprehension of 32 environmental symbols/signs, pictographs, and trademarks. The Communication Activities of Daily Living- II (CADL-II) was used to assess functional communication and the Aphasia Diagnostic Profiles (ADP) to assess specific parameters of communication. Additionally, a probe was developed which was administered at the end of each ABAB phase. The probe required subjects to verbally identify logos by use in numerous situations (i.e. when presented a composite of logos and trademarks, subjects were asked "Which ones are related to cars?") Also included in the probe was an unknown sign which subjects were asked to

explain (i.e. a sign indicating 5 potential dangers relative to an area with alligators). All standardized assessments and probes were administered by certified speech-language pathologists. While the training protocol and materials were designed by certified speech-language pathologists, training was administered by second year students pursuing a master's degree in communication disorders under the close supervision of the certified speech-language pathologists.

### **Results:**

Both patients exhibited an overall increase in verbal symbol usage and a decrease in verbal errors from the initial to the final probe (see data and graphs included in submission), however, scores at the end of each period did not suggest the traditional peaks and valleys expected of an ABAB design. Additionally, although raw scores were used due to limited availability of standardized measures for assessment across these populations, patient performance over the course of treatment was not found to be statistically different. However, both patients did demonstrate overall improvement on the ADP, as well as, gains in ADP subtests of Information Units and Phrase Length. The subject with TBI additionally demonstrated gains on the ADP Auditory Comprehension (memory) subtest and the CADL-II. Unfortunately, since subjects were only mild to moderately impaired, initial performance on CADL-II for the patient with CVA and for both patients on the environmental symbol assessment approximated the ceiling and appeared to artificially limit the subjects' room for improvement.

### **Conclusions:**

While it appears that both individuals may have benefited from training, further investigation is necessary to explore the efficacy of this type of treatment: (1) since this training only represented 10% of the total time of the individual's weekly treatment during the weeks delivered, the direct impact of training needs further investigation, (2) a larger subject pool is necessary which would afford the opportunity for statistical analysis and (3) a wider diversity of severity level should be investigated as an expansion of efficacy trials. This presentation will describe stimuli, treatment paradigms, outcomes, and potential for clinical implementation.